

What is claimed is:

1           1.     A computer implemented method for generating an interconnect  
2     fabric design problem, the problem including requirements for a  
3     plurality of flows among a set of network nodes, the method comprising  
4     selecting, from among the set of network nodes, a source node and a  
5     terminal node for a flow to be added to the requirements, determining a  
6     maximum capacity available at the selected source node and the selected  
7     terminal node, and generating the flow having a capacity less than or  
8     equal to the lower of the maximum capacity of the source node and the  
9     terminal node.

1           2.     The method according to claim 1, wherein said determining a  
2     maximum capacity comprises determining capacity available at each  
3     port of the source node and selecting the highest available capacity for  
4     the source node ports and determining capacity available at each port of  
5     the terminal node and selecting the highest available capacity for the  
6     terminal node ports.

1           3.     The method according to claim 2, wherein said determining a  
2     capacity at a port of the source or terminal node depends on a specified  
3     degree of port saturation and unused port capacity.

1           4.     The method according to claim 1, further comprising repeating  
2     said selecting, said determining and said generating until a stop  
3     condition is reached.

1           5.     The method according to claim 4, wherein the stop condition is  
2     reached when each node in the set has at least a specified number of  
3     flows.

1        6.        The method according to claim 5, wherein said set of network  
2        nodes comprises a cluster of nodes and wherein the design problem  
3        includes a plurality of clusters.

1        7.        The method according to claim 6, wherein the design problem  
2        includes at least one flow between a pair of the clusters.

1        8.        The method according to claim 7, wherein the design problem  
2        further comprises at least one node not in the clusters having a flow to a  
3        node in the clusters.

1        9.        The method according to claim 1, further comprising generating  
2        an additional flow and determining whether to add the flow to the design  
3        problem according to a specified probability.

1        10.      The method according to claim 9, further comprising repeating  
2        said steps of generating an additional flow and determining whether to  
3        add the flow to the design problem a number of times determined from a  
4        difference between a current number of flows and a specified maximum  
5        number of flows.

1        11.      The method according to claim 1, wherein the flow is assigned to  
2        a single port at each of the source node and the terminal node.

1        12.      The method according to claim 1, wherein the flow is split among  
2        multiple ports at one or both of the source node and the terminal node.

1        13.      A system for generating an interconnect fabric design problem  
2        for communication between a set of nodes, the system comprising:

3 a set of design information including user-specified parameters  
4 for the design problem; and

5 a fabric design problem generation tool that generates a design  
6 for the interconnect fabric including a set of flow requirements among  
7 the set of nodes in response to the design information.

1 14. The system according to claim 13, wherein said fabric design  
2 problem generation tool selects, from among the set of network nodes, a  
3 source node and a terminal node for a flow to be added to the flow  
4 requirements, determines a maximum capacity available at the selected  
5 source node and the selected terminal node, and generates the flow  
6 having a capacity less than or equal to the lower of the maximum  
7 capacity of the source node and the terminal node.

1 15. The system according to claim 14, wherein said fabric design  
2 problem generation tool determines the maximum capacity at the source  
3 node by determining capacity available at each port of the source node  
4 and selecting the highest available capacity for the source node ports and  
5 wherein said fabric design tool determines the maximum capacity  
6 available at the terminal node by determining capacity available at each  
7 port of the terminal node and selecting the highest available capacity for  
8 the terminal node ports.

1 16. The system according to claim 15, wherein said fabric design  
2 problem generation tool determines a capacity at a port of the source or  
3 terminal node based on a specified degree of port saturation and unused  
4 port capacity.

1 17. The system according to claim 14, wherein said fabric design  
2 problem generation tool adds flows to the set of flow requirements until  
3 a stop condition is reached.

1 18. The system according to claim 16, wherein the stop condition is  
2 reached when each node in the set has at least a specified number of  
3 flows.

1 19. The system according to claim 16, wherein the stop condition is  
2 based on bandwidth levels of the flow requirements.

1 20. The system according to claim 13, wherein said set of network  
2 nodes comprises a cluster of nodes and wherein the design problem  
3 includes a plurality of clusters.

1 21. The system according to claim 20, wherein the design problem  
2 includes at least one flow between a pair of the clusters.

1 22. The system according to claim 21, wherein the design problem  
2 further comprises at least one node not in the clusters having a flow to a  
3 node in the clusters.

1 23. The system according to claim 17, wherein the fabric design  
2 problem generation tool generates an additional flow and determines  
3 whether to add the flow to the design problem according to a specified  
4 probability.

1 24. The system according to claim 23, wherein the fabric design  
2 problem generation tool repeatedly generates an additional flow and  
3 determines whether to add the flow to the design problem a number of  
4 times determined from a difference between a current number of flows  
5 and a specified maximum number of flows.